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ABSTRACT

Experimental work on the concept of linguistic difficulty is summarized. Inherent linguistic difficulty is distinguished from contrastive linguistic difficulty. Studies of phonological acquisition are cited which tend to support the notion of an ordered acquisition of language features, and it is recommended that we look to cross-linguistic evidence, to linguistic universals, for guidance in establishing measures of pronounceability for particular sounds and sequences of sounds. In discussing semantic difficulty, the author focuses on the need for the language learner to discover the semantic correlates of the various parts of speech. The need for more study in the area of contrastive difficulty is noted, and existing work in contrastive phonology is discussed. (PM)

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THE CONCEPT OF LINGUISTIC DIFFICULTY

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Discussions of linguistic difficulty can be roughly categorized according to their concern with inherent linguistic difficulty or contrastive linguistic difficulty. These discussions may be further categorized by their concern with phonological, syntactic, or semantic difficulty.

Discussions of inherent linguistic difficulty tend to focus on physiological, maturational, and temporal factors which suggest that certain linguistic units and unit sequences are universally more difficult to articulate, audit, or process than certain other units and unit sequences. Studies of contrastive linguistic difficulty suggest that linguistic habit renders certain non-native utterance types differentially more difficult to articulate, audit, or process than more practiced native utterance types. These two types of studies often prove mutually supportive (Hansen and Rodgers, 1965). It is not obviously true that this should be the case. There are not strong *a priori* reasons to assume that the factors which determine the ease or difficulty of a child's acquisition of native language structures should be qualitatively similar to those which determine the ease or difficulty of an adult's acquisition of a second language. There is some, admittedly controversial, evidence that this is indeed the case (Chomsky, 1965).

Evaluative terms such as difficulty, complexity, meaningfulness, and pronounceability are not easily defined in even extremely rarefied experimental situations. Such terms appear to make those with predominately linguistic interests particularly uneasy. John Carroll comments in his review of research relevant to second-language teaching, "pronounceability of nonsense syllables has been used as an experimental variable (Underwood and Schulz, 1960). Foreign language words are not aggregates of literal symbols but sequences of sound; that is, sequences of phonemes, and it is supererogatory to ask whether they are pronounceable" (Carroll, 1963). This would seem to imply that to ask if certain foreign language words are more or less pronounceable than others would be likewise supererogatory. One need not overindulge introspection, I think, to claim that most students of a foreign language will find some words harder to say or to recognize than others.

Inherent Difficulty: Pronounceability

What exactly is to be understood by the term phonological difficulty or, what we will call pronounceability? Underwood and Schulz derived pronounceability ratings for 178 trigrams by having subjects rate these items on a 9-point scale of pronounceability. No attempt was made to ascertain the basis on which subjects determined pronounceability. Underwood and Schulz acknowledged that pronounceability, derived experimentally, and rate of learning were highly correlated. Feeling that pronounceability was "somewhat barren of theoretical potential" they failed to pursue this learning variable more systematically. Other investigators have discussed pronounceability in terms of the articulatory ease of a pronounced sound string or syllable (Saporta, 1954) or in terms of the variability of pronunciation responses to a particular stimulus string (Gibson, et al, 1966) or in terms of the type and number of phonotactic rules determining pronunciation for a particular verbal item (Lib-man, et al, 1959).

Jakobson notes that linguistics concerns itself with language "in all its aspects - language in operation, language in drift, language in the nascent state, and language in dissolution" (Jakobson and Halle, 1956). These fields of linguistic inquiry are approximately those fields usually indicated by the terms: synchronic linguistics, diachronic linguistics, language acquisition and language pathology. It does not seem unreasonable from a linguistic point of view to feel that these different branches of linguistic study might yield useful clues for an empirical definition of pronounceability. It might further be expected that if a concept such as pronounceability is a viable one, then these different studies might be mutually supportive. For an example, Jakobson's studies in language acquisition and language pathology have indicated aphasic regression "to be a mirror of the child's acquisition of speech sounds, it shows the child's development in reverse. Furthermore, comparison of child language and aphasia enables us to establish several laws of implication." Such laws of implication suggest a range of difficulty of speech sounds and sequences, a possible rating of pronounceability, in our terms.

Studies of phonological acquisition tend to support Jakobson's notion of the ordered acquisition of features (Ervin and Miller, 1963). Summarizing several of these studies Ervin and Miller note the following generalizations:

1. Vowel-consonant contrast usually the first contrast.
2. Early stop-continuent contrast.
3. Two consonants alike in manner of articulation will show a labial dental place of articulation contrast.
4. Place contrasts precede voicing contrasts.
5. Affricates and liquids appear late.
6. Low-high precede front-back vowel contrasts.
7. Consonant clusters appear late with initial consonants preceding final contrasts.

These generalizations and their ordering when compared to phonological disintegration in aphasia tend generally to support the Jakobsonian thesis (Durand, et al, 1939).

The studies mentioned at the outset of this section discuss an experimental aspect of synchronic linguistics (language in operation). We might look also to cross-linguistic evidence, to linguistic universals, for guidance in establishing measures of pronounceability. One assumption might be that phonological sequences that are universally unfavored are less pronounceable than sequences universally favored. In his studies of universals of initial and final consonant sequences Greenberg notes the following:

1. For initial and final systems, if $\underline{x}$ is the number of sequences of length $\underline{m}$ and $\underline{y}$ is the number of sequences of length $\underline{n}$ and $\underline{m} > \underline{n}$, and $\underline{p}$ is the number of consonant phonemes, then $\frac{\underline{x}}{\underline{p}^{\underline{m}}} \leq \frac{\underline{y}}{\underline{p}^{\underline{n}}}$.

   In other words, the proportion of the logically possible ambinates utilized decreases or remains the same with increasing length of the sequences. This may be illustrated for English initial clusters as follows: the number of consonant phonemes are 22. All of these except /z/ and /ŋ/ occur as single phonemes. The logically possible sequences of length 2 are $22^2 = 484$. Of these 28 occur. For length 3 the logically possible number of combinations is $22^3 = 10,648$. Of these only 6 occur...

> 2. For initial and final systems, if x is the number of sequences of length m and y is the number of sequences of length n, and $m > n$ and $n \geq 2$, the $x \leq y$ ... syllables containing sequences of n consonants in a language are to be found as syllabic types, then sequences of $n-1$ consonants are also to be found in the corresponding position (prevocalic or postvocalic) except that CV → V does not hold ...
>
> In general, the validity of 1 and 2, to which no exception was found in the 104 languages of the sample, provides objective evidence of the "difficulty" of clusters. This would seem to correlate with the diachronic tendency towards their simplification, since any simplification automatically reduces the number, both absolutely and proportionally, of sequences of the length subject to reduction and increases the number of shorter sequences. (Greenberg, 1965).

Studies of language drift, historical linguistics, (in our case, sound change) have indicated certain tendencies similar to those already noted. The relatively great susceptibility of the liquids to dissimilation (Heffner, 1960) is an example, as is the simplification of consonant clusters (Meillet, 1926, and Martinet, 1955). Dialect changes and register changes within an idiolect similarly show the shortening of consonant clusters, particularly final consonant clusters (Labov, 1966). Such observations lend further "objective evidence of the 'difficulty' of clusters."

Syntactic Difficulty

Most of the interest that linguists and psycholinguists have shown in regard to linguistic difficulty has been in the area of syntax. Theories of sentence structure in terms of: a) sequential word dependencies (Miller and Frick, 1949); b) constituent depth (Yngve, 1960); and c) transformational derivation (Chomsky, 1957) have led to experimental studies testing these theoretic possibilities (a) Miller and

Selfridge, 1953, b) Martin and Roberts, 1966, c) Clifton and Odom, 1966]. Sentence recall, recognition, and reconstruction tasks have been given to subjects in experiments in which the predictive validity of the syntactic theories is tested. Much of this research has been of high quality, innovative, and insightful. A broader review of this work must await a more syntactically relevant set of issues than here examined.

Semantic Difficulty

Examinations of the influence of semantic structure on language learning and behavior have tended similarly to focus on sentence-length sequences (Miller and Isard, 1963, and Rosenberg, 1965). These results, as interesting as many of those in syntactic structure, are outside the range of the present research.

Attempts at semantic word classification have employed techniques such as componential analysis, the semantic differential, and free association elicitation. The first two of these have not led, as yet, to broadly interpretable results. Free association norms, like the Underwood and Schulz pronounceability ratings, display the phenomena of interest but yield little help in explaining the phenomena. An attempt to place associative research in a more theoretically oriented context has been made by Deese (1965).

Defining word classes in terms of function rather than meaning has been one of the self-appointed tasks of American structural linguistics. Subsequent attempts to determine the psychological validity of such structurally determined classes have been undertaken in a small number of studies (Kean and Yamamoto (1957) and Brown (1957)). Brown's experiments indicated that "In learning a language it must be useful to discover the semantic correlates of the various parts of speech; for this discovery enables the learner to use the part-of-speech membership of a new word as a first clue to its meaning." Linguistic motivations for a distinction such as concrete versus abstract noun are discussed in Weinreich (1966), Katz (1966), and Chomsky (1965). Experiments by Dukes and Bastian (1966), Epstein (1962), Gorman (1961) and Paivio (1963), suggest that a) subjects are in substantial agreement as to what represent abstract and concrete nouns and that b) concrete nouns are more readily recalled in various kinds of learning tasks than are abstract nouns. These results seem generally in keeing with informal observations of second-language learning which

indicate that in vocabulary acquisition "an abstract word is more difficult than a concrete word" (Higa, 1966).

A broader test of the psychological validity of linguistic form classes was undertaken by Glanzer (1962). In paired-associate learning of nonsense-English and English-nonsense pairs Glanzer observed form class to be a significant variable giving the following rankings in terms of ease of learning: English-nonsense: noun, adjective, advert, verb, pronoun, preposition, conjunction; nonsense-English: noun, adjective, verb, pronoun, adverb, preposition, conjunction. A vocabulary experiment using 20 stimulus items from the auxiliary language Ru Ro paired with dictionary-appropriate English responses gave results similar to Glanzer's. Pairs with English noun responses were mastered most quickly followed by adjectives and interjections, pronouns, verbs, prepositions, and adverbs (Morgan and Bonham, 1944).

Contrastive Difficulty

Contrastive studies, particularly in the area of phonology, are an important part of the audio-lingual language teaching package. Quite comprehensive contrastive phonological analyses appear in the Contrastive Structure Series for which texts on Spanish, German, and Italian have been published. For the most part, rankings of contrastive difficulty or the influence of contrastive difficulty on other aspects of language learning, e.g., vocabulary mastery, are not offered. An exception to the first appears in Stockwell and Bowen's The Sounds of English and Spanish. Chapter 2 posits a hierarchy of phonological difficulty based on learning theoretic notions of positive, negative, and zero transfer. A given phone is considered either of optional, obligatory or zero availability in a particular language. Where a phone has a zero status in the native language and an obligatory status in the target language the transfer difficulty is considered maximal, that is, contrastive, phonological difficulty is greatest. Intervocalic Spanish [b], represented orthographically as b or v, is an example. This sound exists neither optionally nor obligatorally in English (i.e., has zero availability) and hence is considered maximally difficult for the English speaker to master in learning Spanish.

In theory it would be possible to construct for each syllable or other phonological sequence an index of difficulty based on the averaged scores of transfer difficulty for each component sound segment. No attempts to construct such scores or to validate empirically the suggested scaling was reported

by Stockwell and Bowen. It appears that certain assumptions, especially that concerning the hierarchical distinctions between negative and zero transfer contrasts, are arguable. Nevertheless the general proposal seems reasonable and experimentally testable.

An ambitious attempt to determine difficulty rankings on the basis of contrastive phonological analysis and then to verify these rankings experimentally is reported by Brière (1966). Brière ranked the similarity of sound pairs from the native and target languages on the basis of like or unlike "articulatory features, phonemic status, and privilege of occurrence within the respective systems." The greater the number of shared features, the more similar were assumed the two sounds, and the smaller the production problem for the native speaker articulating the target-language sound. Native speakers of the target languages judged the "nativeness" of the experimental subject's sound production on a 3-point scale. These ratings were then correlated with the "shared feature" scalings previously determined.

Brière reports some incidental findings of some interest. His study shows that "no correlation between frequency of occurrence and hierarchy of difficulty, and no prediction of transfer or interference can be based on the frequency of occurrence of phonemes within the n or t systems." This comment is of some interest in view of various kinds of statistical (Zipf, 1935) experimental (Underwood and Schulz, 1960) and linguistic (Greenberg, 1965) evidence which suggests a fairly high correlation between frequency of use (by type or token) and measures of linguistic difficulty. Brière further reports that his experiments demonstrate "that the syllable is frequently a better prime than the word on which to base a contrastive analysis of two languages."

The particular scales adopted by Brière did not, in general, yield predictions of difficulty that were experimentally supported. It would appear, minimally, that feature differences must be differentially weighted. It is probable that the syllable position of the sound to be produced or perceived also influences difficulty. Brière admits that his research does not yield determinations of "specific classificatory features attended to by the decoders of the respective languages being investigated or of the role of production as a possible mediator to perception." The generally poor predictive value of feature analysis for experimentally observed performance suggests that one should

seek alternative procedures for scaling pronounceability in experiments such as those here reported.

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